

A136
PSW

Table 1.--Insect-caused damage to Douglas-fir
cones and seeds, northern California, 1954

National forest and location	:	Percent of seed crop destroyed	:	Number of seed sampled
Six Rivers N. F.				
Upper Bee Creek		91.8		541
Orleans		91.4		445
Average or total		91.6		986
Klamath N. F.				
Happy Camp		99.1		572
Elk Creek		96.4		506
Average or total		97.8		1,078
Mendocino N. F.				
Ball Mountain		89.1		490
Log Springs		86.4		522
Average or total		87.7		1,012
Shasta-Trinity N. F.				
Wildwood		70.4		486
Parker Creek		77.2		382
Pondosa		67.2		498
Average or total		71.6		1,366
Lassen N. F.				
Hat Creek		53.2		474
All five national forests		82.2		4,916

Table 2.--Damage to sugar pine cones, caused by the
sugar-pine cone beetle, northern California, 1954

National forest	:	Trees sampled	:	Cones in sample			:	Aborted cones
		No.		Good	Aborted	Total		
		No.		No.	No.	No.		Pct.
Lassen		18		348	779	1,127		69.1
Stanislaus		23		242	1,386	1,628		85.4
Plumas		7		31	396	427		92.7
Mendocino		7		286	288	574		50.1
Shasta-Trinity		5		79	37	116		31.8
Klamath		5		156	558	714		78.1
Total		65		1,142	3,444	4,586		75.1

Average production of one-year cones per tree

THE VERTEBRATE FAUNA OF THE SAN JOAQUIN EXPERIMENTAL RANGE

BY HENRY E. CHILDS, JR., AND WALTER E. HOWARD

MISCELLANEOUS
PAPER No. 19
FEBRUARY 1955

FOREST SERVICE

CALIFORNIA
FOREST & RANGE
EXPERIMENT STATION

U. S. DEPARTMENT OF AGRICULTURE

FOREWORD

An area of 4,600 acres in Madera County was established in 1934 as a field branch of the California Forest and Range Experiment Station, United States Forest Service. Since that time, a program of range research has been conducted jointly with the Agricultural Experiment Station, University of California.

Here several agencies work together on a program of research aimed at increased production from California foothill lands. The University, a primary cooperator in all of the studies, provides the experimental cattle herd and conducts studies of livestock feeding and management and of wildlife on range lands. The California Forest and Range Experiment Station jointly with the University and, beginning in 1954, with the Agricultural Research Service, conducts studies of range management, reseeding, fertilization, and brush control. Other Federal and State agencies cooperate in projects of mutual benefit.

The Experimental Range serves also as an outdoor laboratory and a demonstration area for high school and college classes, and for numerous visitors from other States and foreign countries.

This report, one of several papers relating to cooperative studies of wildlife on this range area, brings together an 18-year record of the occurrence of vertebrate animals, including many that have significant effects on range forage production and use.

M. W. Talbot, Chief
Division of Range Management Research

The California Forest and Range Experiment Station is maintained by the Forest Service, U. S. Department of Agriculture, at Berkeley, California, in cooperation with the University of California.

Agriculture - Berkeley

Contents

Introduction and description of the area	• • • •	1
Species accounts		
Fish	• • • • • • • • • •	3
Amphibians	• • • • • • • • • •	3
Reptiles	• • • • • • • • • •	4
Mammals	• • • • • • • • • •	6
Birds	• • • • • • • • • •	10

THE VERTEBRATE FAUNA OF THE SAN JOAQUIN EXPERIMENTAL RANGE

By Henry E. Childs, Jr.^{1/} and Walter E. Howard^{2/}
Department of Zoology, University of California
Davis, California

The relationships of wildlife to range lands have always been an integral part of the research program at the San Joaquin Experimental Range, O'Neals, California. In cooperation with the California Forest and Range Experiment Station, biologists of the U. S. Fish and Wildlife Service, the California Department of Fish and Game, the University of California, and other organizations, have studied many subjects of basic biology, which have contributed to the solution of practical range problems. In general, these studies have been concerned with life histories of common rodent species, analysis of food habits of some of the reptile, bird, and mammal predators, measuring the impact of rodent species on range forage, quail management, and other zoological subjects that pertain to range lands. The purpose of this report is to bring together what has been learned about the occurrence of vertebrate animals on the area during the past 18 years.

The San Joaquin Experimental Range is located near the center of the State in the foothills of the Sierra Nevada in Madera County, 23 miles northeast of Madera and 28 miles north of Fresno. The area is characterized by rolling grass-covered hills, sparsely covered with trees and brush. The elevation varies from 700 to 1,700 feet, most of the area lying between 1,000 and 1,500 feet. Exposures are generally southwesterly. The drainage basin empties into a small tributary of the San Joaquin River. There are no permanent streams, but many springs. Soils are granitic in origin and are classed in the Vista and Visalia series. They have little water storage capacity.

The climate is characterized by mild winter temperatures and high summer temperatures and by a distinct winter rainy season followed by a comparatively rainless summer period. Rainfall has averaged 19.8 inches with extremes of 12.3 and 32.1 during the last 18 years.

Ecologically speaking, the area lies near the lower limits of the Upper Sonoran Zone. The vegetation includes grassland, some of which was formerly cultivated, parklike savanna, and occasionally dense thickets of trees and shrubs. More than half of the herbaceous forage is composed of broadleaf filaree (Erodium botrys Bertol), soft chess (Bromus mollis L.), and foxtail fescue (Festuca megalura Nutt.), although there are more than 250 species of grasses and forbs represented. The dominant brush plant is wedgeleaf ceanothus (Ceanothus cuneatus (Hook.) Nutt.). The most common trees are interior live oak (Quercus wislizeni A. DC.), blue oak (Quercus douglasii Hook. & Arn.), and digger pine (Pinus sabiniana Dougl.).

^{1/} Present address: Compton Junior College, Compton, California.
^{2/} " " Field Station Administration, University of California, Davis, California.

The nomenclature used in the faunal list was obtained from Joseph Grinnell, "Review of the Recent Mammal Fauna of California," University of California Publications in Zoology, Vol. 40, pp. 71-234, 1933; J. Grinnell and A. H. Miller, "Distribution of the Birds of California," Pacific Coast Avifauna, No. 27, 608 pp., 1944; Robert C. Stebbins, "Amphibians of Western North America," University of California Press, 539 pp., 1951; and Dr. Stebbins provided the nomenclature for the reptiles.

The authors wish to express their grateful appreciation to the California Forest and Range Experiment Station for providing the facilities and encouragement which has made this study possible at one of their stations. In the preparation of this manuscript, observations made by numerous persons since 1934 have been utilized, in particular the unpublished manuscript by J. T. Wright on the biological survey of the San Joaquin Experimental Range (1937).

The nomenclature used in the faunal list was obtained from Joseph Grinnell, "Review of the Recent Mammal Fauna of California," University of California Publications in Zoology, Vol. 40, pp. 71-234, 1933; J. Grinnell and A. H. Miller, "Distribution of the Birds of California," Pacific Coast Avifauna, No. 27, 608 pp., 1944; Robert C. Stebbins, "Amphibians of Western North America," University of California Press, 539 pp., 1951; and Dr. Stebbins provided the nomenclature for the reptiles.

The authors wish to express their grateful appreciation to the California Forest and Range Experiment Station for providing the facilities and encouragement which has made this study possible at one of their stations. In the preparation of this manuscript, observations made by numerous persons since 1934 have been utilized, in particular the unpublished manuscript by J. T. Wright on the biological survey of the San Joaquin Experimental Range (1937).

FISH (5)

The occurrence of fish at the San Joaquin Experimental Range is dependent on introduction into artificial ponds. Since the removal of the horse pasture dam in 1951, there have been no bass or bluegill. All water disappears from the remaining reservoirs in dry years, so only re-introductions can maintain the present populations. No fish are found in the intermittent streams on the Range.

Check List of Fish

Mosquito fish	(<u>Gambusia affinis</u>)
*Large-mouth bass	(<u>Micropterus salmoides</u>)
Hitch	(<u>Lavinia exilicauda</u>)
Green sunfish	(<u>Lepomis cyanellus</u>)
*Bluegill	(<u>Lepomis macrochirus</u>)

AMPHIBIANS (8)

The semi-arid conditions in the foothill belt of California are not suitable for a large or varied amphibian population. One introduced species, the bullfrog, is found in the reservoir at headquarters. Two Anurans, the Pacific tree frog and the Western spadefoot toad, are the most abundant members of this group.

Check List of Amphibians

California newt	Western toad
Tiger salamander	Pacific tree toad
Slender salamander	*Red-legged frog
Western spadefoot toad	Bullfrog

California newt (Triturus torosus sierrae). Rare
Two specimens were taken in the spring of 1952. None were seen in 1950-51, although K. A. Wagnon recalls observing the California newt occasionally in the 1930's. Newts are abundant at O'Neals, 3 miles away.

Tiger salamander (Ambystoma tigrinum californiense). Rare
Found in limited numbers near the dams in the headquarters area. On February 22, 1952, eggs were found where the horse pasture dam used to be. Several albino larvae were taken in 1950-51.

Slender salamander (Batrachoseps a. attenuatus). Uncommon
Found under rocks and logs in the wet season.

*No specimen in collection at Range.

Western spadefoot toad (Scaphiopus h. hammondi). Abundant

The spadefoot breeds in vernal pools and intermittent streams in varying numbers depending on weather conditions in early spring. Singing begins in late January with most egg production in March. Albino larvae are occasionally found.

Western toad (Bufo boreas halophilus). Common

These toads may be found foraging at night. Eggs were found on February 22, 1952, where the horse pasture dam used to be.

Pacific tree toad (Hyla regilla). Abundant

Found in wet areas throughout the year where it breeds in streams and vernal pools.

Red-legged frog (Rana aurora draytonii). Rare

One was observed in October, 1951. The yellow-legged frog (Rana boylei) has not been observed at the Range although both of these species are abundant at O'Neals, 3 miles away.

Bullfrog (Rana catesbeiana). Common

Formerly abundant before the destruction of the horse pasture dam in 1951.

REPTILES (17)

Reptiles appear well suited to the climate of the Range as indicated by their numbers and diversity of kinds. Three lizards, the Gilbert skink, the whiptail lizard, and the Western fence lizard, and two snakes, the Pacific gopher snake and the Pacific rattlesnake, are the most abundant species. For a detailed account of the snakes, refer to: H. S. Fitch, 1949, Study of Snake Population in Central California, Am. Midl. Nat., 41(3):513-579.

Check List of Reptiles

Lizards (6)

Western fence lizard
Side-blotched lizard
Pacific Coast horned lizard
Gilbert skink
Whiptail lizard
Southern alligator lizard

Turtles (1)

Pacific mud turtle

Snakes (10)

Western ring-necked snake
Western yellow-bellied racer
California striped whipsnake
Pacific gopher snake
King snake
Long-nosed snake
Sierra Nevada garter snake
Red-sided garter snake
California spotted night snake
Pacific rattlesnake

Lizards (6)

Western fence lizard (Sceloporus o. occidentalis). Abundant

The first lizard to become active in the spring, generally on warm days in February or March. Found around buildings, rock outcrops, and trees.

Side-blotched lizard (Uta stansburiana hesperis). Common
Found in sandy areas where escape burrows are present.

Pacific Coast horned lizard (Phrynosoma coronatum frontale). Rare
Observed in the late 30's but has not been recorded in recent years.

Gilbert skink (Eumeces g. gilberti). Abundant
This species and the whiptail lizard are taken abundantly in drift traps. The skink appears to be active only from April to June in dense vegetation.

Whiptail lizard (Cnemidophorus t. tessellatus). Abundant
Found in sparse vegetation and along roads; active during the entire summer.

Southern alligator lizard (Gerrhonotus multicarinatus webbi). Rare
Only a half dozen have been recorded in the headquarters area.

Turtles (1)

Pacific mud turtle (Clemmys marmorata). Uncommon
Presence of the reservoir allows a few introduced individuals to reproduce themselves.

Snakes (10)

Western ring-necked snake (Diadophis amabilis pulchellus). Rare
A few have been recorded along the swale in headquarters area.

Western yellow-bellied racer (Coluber constrictor mormon). Uncommon
Taken occasionally in the drift traps in headquarters area.

California striped whipsnake (Coluber lateralis). Common
Widespread on the Range.

Pacific gopher snake (Pituophis c. catenifer). Abundant
Widely distributed over the Range, perhaps more abundant than the rattlesnake.

King snake (Lampropeltis getulus californiae). Common
Found in small numbers on the Range.

Long-nosed snake (Rhinocheilus l. lecontei). Rare
Drift trap records indicate a greater abundance of this snake than was once believed.

Sierra Nevada garter snake (Thamnophis elegans couchii). Common
Found along streams.

Red-sided garter snake (Thamnophis sirtalis tetrataenia). Common
Limited to moist areas.

California spotted night snake (Hypsiglena torquata nuchalata). Rare
Recorded in rock outcrops and in walls of wells.

Pacific rattlesnake (Crotalus viridis oreganus). Abundant
A thorough study of the habits of this species was made. Fitch and Glading, 1947, A Field Study of a Rattlesnake Population, Calif. Fish and Game 33(2):103-123. A population of 1 per acre is estimated.

MAMMALS (37)

Most of the mammalian investigations have concerned rodents because these animals occur in great numbers and also because their undesirable effects on forage production become of economic significance.

Check List of Mammals

*Virginia opossum	Merriam chipmunk
Broad-footed mole	Gray squirrel
*Adorned shrew	Botta pocket gopher
Yuma myotis	San Joaquin pocket mouse
California myotis	California pocket mouse
Western pipistrelle	Heermann kangaroo rat
*Red bat	Southern grasshopper mouse
Pallid bat	Western harvest mouse
Mexican free-tailed bat	Deer mouse
Raccoon	Brush mouse
Long-tailed weasel	Pinon mouse
Spotted skunk	Dusky-footed wood rat
Striped skunk	California meadow mouse
Badger	House mouse
Gray fox	*Yellow-haired porcupine
Coyote	Black-tailed jack rabbit
*Mountain lion	Audubon cottontail
Bobcat	*Mule deer
Beechey ground squirrel	

Virginia opossum (Didelphis v. virginiana). Rare
One was recorded in an owl pellet: Fitch, 1947, Predation by Owls in the Sierra Foothills of California, Condor 49(9): 137-151.

Broad-footed mole (Scapanus l. latimanus). Rare
Two specimens were taken in gardens at headquarters in March, 1953.

Adorned shrew (Sorex o. ornatus). Rare
One was caught in a drift trap on April 1, 1951. The specimen is located at the Museum of Vertebrate Zoology, Berkeley.

*No specimen in collection at Range.

Yuma myotis (Myotis yumanensis sociabilis). Common
Found at night in barns and around adobe buildings.

California myotis (Myotis c. californicus). Common
Habits are the same as the Yuma myotis.

Western pipistrelle (Pipistrellus hesperus merriami). Common
This early evening flyer was first collected in June, 1950.

Red bat (Lasiurus borealis teliotis). Rare
Recorded only in an owl pellet by Fitch (see Virginia opossum).

Pallid bat (Antrozous pallidus pacificus). Abundant
Not recorded on the Range by J. T. Wright in 1937, but the pallid bat is now an abundant night roosting bat in the barns and adobe buildings. J. C. Quast observed them flying out of holes in a blue oak at dusk during the summer of 1949. Banding studies on this species have been carried out since 1950 by S. F. Wood, who studied the blood parasites, and by the senior author.

Mexican free-tailed bat (Tadarida mexicana). Uncommon
Only a few records in early spring have been obtained while they were night roosting with the pallid bat.

Raccoon (Procyon lotor psora). Common
Widespread over the Range along swales.

Long-tailed weasel (Mustella frenata xanthogenys). Rare
One was captured in the drift traps on May 6, 1950.

Spotted skunk (Spilogale gracilis phenax). Rare
Two, both road kills, found in 1951-52.

Striped skunk (Mephitis mephitis occidentalis). Uncommon
A few individuals have been trapped or seen.

Badger (Taxidea taxus neglecta). Common
Although not often seen, even at night, diggings indicate badgers are present in good numbers.

Gray fox (Urocyon cinereoargenteus townsendi). Common
Probably less abundant now than formerly because of rodent and predator control activities.

Coyote (Canis latrans ochropus). Common
Coyotes have been controlled since 1936, although occasionally one is seen or heard.

Mountain lion (Felis concolor californica). Rare
Several sight records have been made since 1934.

Bobcat (Lynx rufus californicus). Common

Probably now the most abundant of the carnivores. Frequent sight observations are made and many are taken by predator control operators.

Beechey ground squirrel (Citellus beecheyi fisheri). Abundant

Because of its abundance and obvious economic importance, this species has received much attention. The life history of this animal was studied: Fitch, 1948, Ecology of the California Ground Squirrel on Grazing Lands, Am. Midl. Nat. 39(3): 513-596. It was demonstrated in pen studies that these rodents at 12 per acre are capable of destroying 35 percent of the forage that would have been produced if the squirrels had not been present: Fitch and Bentley, 1949, Use of California Annual-plant Forage by Range Rodents, Ecology 30(3):306-321.

Merriam chipmunk (Eutamias m. merriami). Uncommon

This species seems restricted to rock outcrops where brush or fallen trees are found. J. T. Wright indicates that it may have been more abundant in former years.

Gray squirrel (Sciurus g. griseus). Uncommon

The gray squirrel is found in association with digger pines. It is probably exposed to greater predation here than in most parts of its range because of the necessity of moving from tree to tree on the ground.

Botta pocket gopher (Thomomys bottae mewa). Abundant

This species perhaps surpasses the ground squirrel for the title of the most destructive rodent on range lands, because they occur in much greater numbers. It was found that 32 per acre reduced forage by 25 percent in the pen study mentioned under Beechey ground squirrel. A population and life history study by live trapping was started in 1948. An above-ground dispersal has been demonstrated by the drift trap study.

San Joaquin pocket mouse (Perognathus i. inornatus). Common

Appears to be common where vegetation is sparse.

California pocket mouse (Perognathus californicus ochrus). Uncommon
Only irregularly taken.

Heermann kangaroo rat (Dipodomys heermanni tularensis). Common

At one time very abundant. A change from "perhaps 30 per acre to only one," during the period 1935 through 1946 is reported: Fitch, 1948, Habits and Economic Relationships of the Tulare Kangaroo Rat, Jour. Mammal. 29(1):5-35.

Southern grasshopper mouse (Onychomys torridus tularensis). Rare

Reported only in association with Lotus scoparius in the big canyon below headquarters. An attempt to find them in this area in the summer of 1952 was unsuccessful.

Western harvest mouse (Reithrodontomys megalotis longicaudus). Uncommon
Found in the swale areas in ungrazed pastures.

Deer mouse (Peromyscus maniculatus gambeli). Abundant
The deer mouse is found in open grazed pastures away from rocks or brush.

Brush mouse (Peromyscus b. boylei). Abundant
Found generally in rock outcrops.

Pinon mouse (Peromyscus truei gilberti). Abundant
This species is most abundant in ungrazed brush.

The relative abundance of the three species of Peromyscus may be interpreted from the following summary of total catch in standardized trap lines in two grazed pastures and in the ungrazed natural area during October 1951, April and October 1952, and April 1953. The numbers caught were: P. boylei, 43; P. truei, 20; P. maniculatus, 11; P. inornatus, 6; Dipodomys, 5; Neotoma, 2; Reithrodontomys, 1; Eutamias, 1; Total, 89.

Dusky-footed wood rat (Neotoma fuscipes streatorum). Common
The wood rat is widespread in occurrence in brush and rock outcrops.

California meadow mouse (Microtus californicus mariposae). Common
The meadow mouse is restricted to ungrazed areas where it may become very abundant. A cyclic peak in abundance was observed in 1951.

House mouse (Mus musculus). Rare
Only an occasional individual was taken in the headquarters area.

Yellow-haired porcupine (Erethizon e. epixanthum). Rare
One was reported some years ago by K. A. Wagnon and one was found dead on the entrance road in June, 1953.

Black-tailed jack rabbit (Lepus c. californicus). Uncommon
Occasional individuals or family groups are seen.

Audubon cottontail (Sylvilagus audubonii vallicola). Abundant
It is widely distributed over the Range, frequently seen in numbers in the evenings during summer on lawns around headquarters.

Mule deer (Odocoileus hemionus). Uncommon
Apparently deer have increased in numbers since 1934. There are not, however, much more than a dozen residents on the Range and no apparent migrants.

BIRDS (133)

Much has been written of the avifauna of California. Yet works restricted to the upper Sonoran zone, and to particular localities in it, are rare. The following accounts picture the bird populations in the foothill areas of the central part of the State as shown by the records made at the San Joaquin Experimental Range. The following definitions of status are used:

Permanent resident - a nesting bird found throughout the year.

Summer resident - a nesting bird found only during the nesting season.

Winter resident - a non-nesting species found only in winter.

Migrant - a non-nesting species found in the fall and/or spring, but rare or absent at other times.

Vagrant - species recorded only rarely with no particular pattern of occurrence which would allow their inclusion in the other classifications.

Residents are classed according to relative abundance by numbers 1, 2 and 3, the latter being the rarest category.

For detailed accounts of the distribution of the birds here recorded, see Grinnell and Miller, "The Distribution of the Birds of California." Where subspecies status has been determined from specimens, this has been added to the scientific name; the common name for the species has been used in every instance.

Check List of Birds

The following two lists include only the nesting species and winter residents. The migrants (13) and vagrants (61) appear only in the annotated list. The status of some of the vagrants is tentative; to include them in other categories would only overemphasize their importance.

Permanent Residents (31)

Cooper hawk	Plain titmouse
Red-tailed hawk	Bushtit
Sparrow hawk	White-breasted nuthatch
California quail	Bewick wren
Killdeer	Canyon wren
Mourning dove	California thrasher
Road-runner	Mexican bluebird
Barn owl	House sparrow
Screech owl	Western meadowlark
Horned owl	Brewer blackbird
Red-shafted flicker	House finch
Acorn woodpecker	Lawrence goldfinch
Downy woodpecker	Brown towhee
Nuttall woodpecker	Lark sparrow
Black phoebe	Rufous-crowned sparrow
Scrub jay	

Summer Residents (14)

Turkey vulture
Anna hummingbird
Western kingbird
Ash-throated flycatcher
Wood pewee
Violet green swallow
Barn swallow

House wren
Blue-gray gnatcatcher
Phainopepla
Red-winged blackbird
Bullock oriole
Cowbird
Black-head grosbeak

Winter Residents (14)

Sharp-skinned hawk
Yellow-bellied sapsucker
Say phoebe
Mockingbird
Rock wren
Robin
Ruby-crowned kinglet

Audubon warbler
Purple finch
Spotted towhee
Oregon junco
White-crowned sparrow
Golden-crowned sparrow
Lincoln sparrow

*Pied-billed grebe (Podilymbus podiceps). Vagrant

Between September 29, 1951 and March 21, 1952, individuals were observed on six occasions on the reservoir; however, none were seen the following year.

*White pelican (Pelecanus erythrorhynchos). Vagrant

A flock of 40 was observed in flight March 30, 1953.

*Great blue heron (Ardea herodias). Vagrant

An occasional bird appears at the reservoir.

*Common egret (Casmerodius albus). Vagrant

Formerly found at the horse pasture dam during the summer, but has not been recorded since September, 1951.

*Black-crowned night heron (Nycticorax nycticorax). Vagrant

One was heard calling in flight at night October 7, 1952.

*Least bittern (Ixobrychus exilis). Vagrant

One female was trapped alive in a drift trap along the swale at headquarters April 16, 1950, and released.

*Canada goose (Branta canadensis). Vagrant

Flocks have been seen in December and January in flight perhaps either to or from Lake Millerton, 6 miles away.

*White-fronted goose (Anser albifrons). Vagrant

A flight of 35 was recorded on December 7, 1951.

*No specimen in collection at Range.

Mallard (Anas p. platyrhynchos). Vagrant

Mallards formerly bred in the region of the horse pasture dam. Pairs were seen regularly in vernal pools in spring. A male collected March 5, 1953 had been feeding on caddis fly larvae.

*Blue-winged teal (Anas discors). Vagrant

A group was reported at the horse pasture dam March 8, 1937 by Ben Glading.

*Redhead duck (Nyroca americana). Vagrant

Five or six were seen on reservoir by J. R. Bentley.

*Ring-necked duck (Aythya collaris). Vagrant

Six individuals were seen in March, 1952. They were absent, as were nearly all ducks, the following season.

*Scaup duck (Aythya marila). Vagrant

A flock of 20 was seen on February 24, 1952.

Ruddy duck (Oxyura jamaicensis). Vagrant

One male was collected June 4, 1937.

*Hooded merganser (Lophodytes cucullatus). Vagrant

Three individuals were noted in February and March, 1952.

*Common merganser (Mergus merganser). Vagrant

One flock of five was recorded February 5, 1952.

Turkey vulture (Cathartes aura teter). Summer resident - 1

A nest was found in a rock outcrop May 22, 1951. Migrating flocks of more than 500 birds have roosted overnight in digger pines during September.

*California condor (Gymnogyps californianus). Vagrant

A flock of six to nine individuals were seen August 30, 1950; Cohen, 1951, California Condors in Madera County, California, Condor 53(3):158.

Cooper hawk (Accipiter cooperii). Permanent resident - 3

Habits of this species on the Range were studied: Fitch, Glading and House, 1946, Observations on Cooper Hawk Nesting and Predation, Calif. Fish and Game 32(3):144-154.

Sharp-shinned hawk (Accipiter striatus). Winter resident - 3

This hawk was recorded between September 12 and April 4.

Red-tailed hawk (Buteo jamaicensis calurus). Permanent resident - 1

This species is the most abundant raptor occurring on the Range. Its habits were reported in detail: Fitch, Swenson and Tillotson, 1946, Behavior and Food Habits of the Red-tailed Hawk, Condor 48(5):205-237.

*No specimen in collection at Range.

*Common rough-legged hawk (Buteo lagopus s. johannis). Vagrant
Two records, September 26, 1951 and March 20, 1952.

*Golden eagle (Aquila chrysaetos). Vagrant
Fitch, Swenson and Tillotson (see red-tailed hawk) recorded it
as frequent in the area. None have been seen since September,
1951.

*Bald eagle (Haliaeetus leucocephalus). Vagrant
Recorded only once by Fitch, Swenson and Tillotson (see
red-tailed hawk).

*Marsh hawk (Circus cyaneus). Vagrant
One was recorded November 28, 1950.

*Prairie falcon (Falco mexicanus). Vagrant
Seen only once, October 6, 1951.

Sparrow hawk (Falco sparverius). Permanent resident - 3
J. T. Wright found a nest in a digger pine in 1937; another
nest was found in a telephone pole March 28, 1953.

California quail (Lophortyx c. californica). Permanent resident - 1
This bird is the most abundant avian resident, nesting from May
to mid-August. Much of the work serving as the basis for quail
management in California was done by Ben Glading and others at
the Range. It was there that Glading developed the artificial
water-storage devices for quail that are known as "gallinaceous
guzzlers."

Virginia rail (Rallus limicola). Vagrant
One specimen has been taken.

*American coot (Fulica americana). Vagrant
Recorded only in an owl pellet: Fitch (see Virginia opossum).

Killdeer (Charadrius vociferus). Permanent resident - 2
Nests of this species were found with four eggs in each
February 28, April 3, May 29 and June 1, 1952.

*Wilson snipe (Capella delicata). Vagrant
One individual was observed twice in late March, 1953.

*Red-backed sandpiper (Erolia alpina). Vagrant
Observed by J. T. Wright in April, 1937.

*Band-tailed pigeon (Columba fasciata). Migrant
The numbers of this species were high in 1951. During 1952 and
1953 only an occasional flock was recorded in February and March.

*No specimen in collection at Range.

Mourning dove (Zenaidura macroura). Permanent resident - 1
Nesting begins in late March and continues to late August.

California road-runner (Geococcyx californicus). Permanent resident - 3
A covey of quail was seen "mobbing" one of these unusual birds
July 31, 1952.

Barn owl (Tyto alba pratincola). Permanent resident - 3
This ground feeding species, although not common, takes many
pocket gophers for food.

Screech owl (Otus asio quercinus). Permanent resident - 2
Heard frequently in the blue oaks on the Range.

Horned owl (Bubo virginianus pacificus). Permanent resident - 1
A detailed account of the horned owl with comments on the
barn owl is provided by Fitch (see Virginia opossum).

American long-eared owl (Asio wilsonianus). Vagrant
A specimen was taken March 4, 1937.

*Texas trilling nighthawk (Chordeiles acutipennis). Vagrant
Recorded in April, May, and October in small numbers.

*Poorwill (Phalaenoptilus nuttallii). Vagrant
One was reported calling by J. C. Quast in August, 1949.

Anna hummingbird (Calypte anna). Summer resident - 3
Present in small numbers from March to November.

*Rufous hummingbird (Selasphorus rufus). Migrant
Two have been recorded: April, 1952 and March, 1953.

*Allen hummingbird (Selasphorus sasin). Migrant
Not recorded in 1952 but several were seen in March, 1953.

*Belted kingfisher (Megaceryle alcyon). Vagrant
An occasional bird is seen on the reservoir.

Red-shafted flicker (Colaptes cafer collaris). Permanent
resident - 2
Resident birds are uncommon but the red-shafted flicker is
frequently seen in winter.

Acorn woodpecker (Balanosphyra formicivora bairdi). Permanent
resident - 1
Very abundant and frequently observed. Acorn storing
habits often damage buildings, power poles, and fence posts.

Lewis woodpecker (Asyndesmus lewis). Migrant
Often present during the winter but was not recorded in
the 1952-53 season although abundant a few hundred feet
below the Range.

*No specimen in collection at Range.

Yellow-bellied sapsucker (Sphyrapicus varius daggetti). Winter resident - 2

The sapsucker arrives as early as September 6 and it remains until late April.

*Downy woodpecker (Dendrocopos pubescens). Permanent resident - 3
Two have been recorded: July 26, 1952 and January 15, 1953.

Nuttall woodpecker (Dendrocopos nuttallii). Permanent resident - 2
A notably territorial species frequently seen in blue oaks and digger pines.

Western kingbird (Tyrannus verticalis). Summer resident - 1
The kingbird arrives in late March and departs in September.

Ash-throated flycatcher (Myiarchus c. cinerascens). Summer resident - 3
Found between mid-April and mid-September in small numbers.

Black phoebe (Sayornis nigricans semiatra). Permanent resident - 3
Nests in culverts around headquarters and in pasture 1.

Say phoebe (Sayornis s. saya). Winter resident - 2
The say phoebe arrives in mid-September and leaves in mid-March. It roosts commonly during the winter in protected places around the headquarters building where 10 have been banded.

Hammond flycatcher (Empidonax hammondi). Migrant
Specimens were taken April 15, 19 and 28, 1937.

Gray flycatcher (Empidonax griseus). Migrant
Specimens were taken April 19 and 21, 1937. Observations of Empidonax flycatchers since 1951 have been few and the birds remain quiet, making specific identification impossible.

Wood pewee (Myiochanes r. richardsonii). Summer resident - 3
Resident status has not been fully determined.

Olive-sided flycatcher (Nuttallornis borealis). Migrant
Two have been recorded, both in May.

*Horned lark (Eremophila alpestris). Vagrant
Recorded once in a drift trap.

Violet-green swallow (Tachycineta thalassina lepida). Summer resident - 1
This swallow arrives around March 1 and leaves by early October. It nests in woodpecker holes in blue oaks and digger pines.

*No specimen in collection at Range.

Tree swallow (Iridoprocne bicolor). Migrant

J. T. Wright considered tree swallows to be resident in 1937.
None have been observed since 1951.

*Rough-winged swallow (Stelgidopteryx ruficollis). Vagrant

One was observed April 26, 1953.

Barn swallow (Hirundo rustica erythrogaster). Summer resident - 3

A nest was found in a culvert under the main road
July 5, 1952.

*Cliff swallow (Petrochelidon albifrons). Vagrant

One was observed May 13, 1953.

*Purple martin (Progne subis). Vagrant

A flock was recorded on May 22, 1948.

Scrub jay (Aphelocoma coerulescens superciliosa). Permanent resident - 1.

This is an early nesting species, young being found in the nest March 31, 1952.

*Holarctic raven (Corvus corax). Vagrant

Two have been recorded: April 21, 1952 and April 1, 1953.

*Clark nutcracker (Nucifraga columbiana). Vagrant

One observed during the period September 15 to October 28, 1950. Conditions in the high country brought many unusual records of this species over California during that year.

Plain titmouse (Parus i. inornatus). Permanent resident - 1

The titmouse is a common species in blue oaks, but it is rarely heard calling after nesting starts in March.

Bush-tit (Psaltiriparus minimus californicus). Permanent resident - 1

Most commonly seen in association with evergreen plant species such as ceanothus and live oaks.

White-breasted nuthatch (Sitta carolinensis oculeata). Permanent resident - 2

This bird has essentially the same ecological requirements as the titmouse.

*Brown creeper (Certhia familiaris zelotes). Vagrant

Three have been recorded: November 30, 1951, January 15 and February 5, 1952.

Wren-tit (Chamaea fasciata henshawi). Vagrant

A specimen was collected March 31, 1937.

*House wren (Troglodytes aedon parkmanii). Summer resident - 3

Presence of a few house wrens in May and June in suitable breeding area suggests that breeding does occur.

*No specimen in collection at Range.

Bewick wren (Thryomanes bewickii drymoecus). Permanent resident - 2
Regularly found in the brushy areas of the Range.

Canyon wren (Catherpes mexicanus conspersus). Permanent resident - 2
Found commonly in the rocky canyons.

Rock wren (Salpinctes o. obsoletus). Winter resident - 2
Seen occasionally in winter.

Mockingbird (Mimus polyglottos leucopterus). Winter resident - 3
About 10 individuals were present around headquarters during the period October 1952 to March 1953, but the mockingbird is rare over most of the Range.

California thrasher (Toxostoma r. redivivum). Permanent resident - 2
This secretive species is heard singing commonly in February and March in brushy areas.

Robin (Turdus migratorius propinquus). Winter resident - 2
The robin arrives in late December and it leaves in early April.

*Varied thrush (Ixoreus naevius). Vagrant
One was recorded December 31, 1951.

Hermit thrush (Hylocichla guttata). Migrant
Seen between January 22 and April 18, 1952, but was not present the following year.

Swainson's thrush (Hylocichla a. astulata). Vagrant
One was recorded May 31, 1953.

Mexican bluebird (Sialia mexicana occidentalis). Permanent resident - 3
Nests in holes in blue oaks. In winter, flocks of 10 to 20 individuals are common.

Mountain bluebird (Sialia currucoides). Vagrant
One was collected from a flock of six on December 31, 1951.

Blue-gray gnatcatcher (Polioptila caerulea amoenissima). Summer resident - 3
Recorded only in the natural area and in April and May.

Ruby-crowned kinglet (Regulus calendula cineraceus). Winter resident - 2
The kinglet is seen commonly in winter, feeding in the foliage of oaks.

Water pipit (Anthus spinoletta). Vagrant
Two have been recorded: April 9, 1937 and March 30, 1952.

*No specimen in collection at Range.

*Cedar waxwing (Bombycilla cedorum). Vagrant
Small flocks are occasionally seen between October and May.

Phainopepla (Phainopepla nitens lepida). Summer resident - 2
Arrives in May and leaves in late September. Nesting is underway by June 1.

Loggerhead shrike (Lanius ludovicianus gambeli). Vagrant
The shrike is recorded occasionally in the open areas.

Solitary vireo (Vireo solitarius). Vagrant
One was seen April 18, 1952.

Warbling vireo (Vireo gilvus). Vagrant
Two were recorded: April 18 and May 15, 1952.

*Orange-crowned warbler (Vermivora celata). Vagrant
One was seen April 18, 1952.

Nashville warbler (Vermivora ruficapilla). Vagrant
Two were recorded: April 18 and September 5, 1952.

*Yellow warbler (Dendroica aestiva). Migrant
Heard regularly between April 20 and June 4.

Myrtle warbler (Dendroica coronata). Vagrant
One was collected on March 2, 1937.

Audubon warbler (Dendroica a. auduboni). Winter resident - 1
This warbler is present in numbers from October to May.

Black-throated gray warbler (Dendroica nigrescens). Migrant
Several were seen in April, 1952.

Townsend warbler (Dendroica townsendi). Migrant
Several were seen in April and May, 1952.

*Hermit warbler (Dendroica occidentalis). Vagrant
One was recorded April 23, 1952.

Yellow-throat (Geothlypis trichas). Vagrant
One was collected April 7, 1952.

Chat (Icteria virens auricollis). Vagrant
One was collected May 10, 1937.

Pileolated warbler (Wilsonia pusilla chryseola). Vagrant
Four individuals were seen on April 30, 1952.

*No specimen in collection at Range.

House sparrow (Passer d. domesticus). Permanent resident - 2
A few individuals are resident around headquarters. In the spring of 1953 there was a noticeable increase of house sparrows nesting in woodpecker holes in blue oaks, a possible result of woodpecker control in that area the previous season.

Western meadowlark (Sturnella neglecta). Permanent resident - 2
Abundant in winter but nests sparingly in summer.

Red-winged blackbird (Agelaius phoeniceus). Summer resident - 2
Arrives in late February and leaves in September. Most of red-winged blackbirds are found in the swale near headquarters.

Bullock oriole (Icterus bullocki). Summer resident - 1
The oriole arrives in April and it leaves by mid-August. It nests in blue oaks.

Brewer blackbird (Euphagus cyanocephalus). Permanent resident - 2
Most abundant in the headquarters area where breeding activity starts in March. Nests are found in mistletoe, in blue oaks, and in vines on various buildings during April and May.

*Brown-headed cowbird (Molothrus ater). Summer resident - 3
Occasional individuals are heard calling from February to June.

Western tanager (Piranga ludoviciana). Vagrant
Observed May 15, July 31, and September 16, 1952.

Black-headed grosbeak (Pheucticus melanocephalus maculatus).
Summer resident - 3
Recorded between April 10 and August 8, 1952.

Lazuli bunting (Passerina amoena). Vagrant
Recorded on April 18, 1952.

Purple finch (Carpodacus purpureus californicus). Winter resident - 3
Seen occasionally during the winter of 1951-52, but was absent in 1952-53.

House finch (Carpodacus mexicanus frontalis). Permanent resident - 2
The linnet is found mainly in the inhabited area of the Range where it nests from May to July.

*Pine siskin (Spinus pinus). Vagrant
One flock was observed in May, 1952.

*Arkansas goldfinch (Spinus psaltria). Vagrant
Three were collected March 18, 1937.

*No specimen in collection at Range.

- Lawrence goldfinch (Spinus lawrencei). Permanent resident - 3
An occasional group of these birds is seen over the Range.
- Green-tailed towhee (Chlorura chlorura). Vagrant
One was collected April 29, 1937.
- Spotted towhee (Pipilo maculatus falcinellus). Winter resident - 1
Arrives in late September and leaves in early April.
- Brown towhee (Pipilo fuscus carolae). Permanent resident - 1
In 1952 nest building began in early April. Life history of the brown towhee is being studied by the senior author.
- Savannah sparrow (Passerculus sandwichensis nevadensis). Vagrant
One was collected May 13, 1937, and again October 21, 1952.
- Vesper sparrow (Poecetes gramineus). Vagrant
One was collected October 12, 1951.
- Lark sparrow (Chondestes grammacus strigatus). Permanent resident - 2
Sparingly resident over the Range.
- Rufous-crowned sparrow (Aimophila r. ruficeps). Permanent resident - 3
Noted only on the walls of the big canyon below headquarters.
J. T. Wright believed their distribution dependent on the deer weed (Lotus scoparius).
- *Slate-colored junco (Junco hyemalis). Vagrant
One was seen December 31, 1951.
- Oregon junco (Junco oreganus thurberi). Winter resident - 1
This junco arrives in mid-October and it leaves in April.
- Chipping sparrow (Spizella passerina arizonae). Migrant
Has been recorded in April, May, September and October in small numbers.
- White-crowned sparrow (Zonotrichia leucophrys gambeli). Winter resident - 1
Arrives in late September and leaves in late April. Mixed flocks of this species with golden-crowned sparrows and Oregon juncos are a common sight in winter.
- Golden-crowned sparrow (Zonotrichia coronata). Winter resident - 1
The golden-crowned sparrow arrives about a week later than the white-crowned but departs about the same time.
- Lincoln sparrow (Melospiza lincolni). Winter resident - 3
A few are present along the swales from early October to April.

*No specimen in collection at Range.